

[0055] As shown in FIG. 7, the switching element 11 includes an electrode 13a and a conductive pattern 13b which are formed of Ag paste at both sides of a resin sheet 12 formed of PET. The electrode 13a and the conductive pattern 13b are formed on the resin sheet 12 by printing, etc.

[0056] The electrode 13a is formed at the top side of the resin sheet 12, and includes a circular electrode 13a1 formed at the center thereof and an annular electrode 13a2 formed around the circular electrode 13a1 with a predetermined gap therebetween. A conductive pattern is formed continuously from a part of the electrode 13a2. The conductive pattern 13b is formed at the bottom side of the resin sheet 12 and is connected to the electrode 13a1. More specifically, a through hole is formed in the resin sheet 12 at a position under the electrode 13a1, and a connecting conductor 14 which electrically connects the conductive pattern 13b and the electrode 13a1 is formed inside the through hole. In addition, a dome-shaped (diaphragm-like) inversion plate 15 is formed at the upper side of the electrode 13a2 such that the inversion plate 15 is in contact with the electrode 13a2 at the periphery thereof and the top point of the inversion plate 15 is positioned directly above the electrode 13a1.

[0057] A resist film 16a is disposed at the periphery of the inversion plate 15, and another resist film 16b is disposed under the conductive pattern 13b. A resin sheet 17 formed of PET is laminated so as to cover the entire surface of the switching element 11, and the resist film 16b is bonded to a metal base 18 with an adhesive layer 19, whereby the switching element 11 is constructed.

[0058] Switching elements constructed as described, with reference to FIG. 7, above are installed under the flat input device 4 in place of the inversion plates 10 shown in FIGS. 2A and 2B. When the flat input device 4 is pushed from above by a finger, both the flat input device 4 and the indicator sheet 7 are deformed and the corresponding inversion plate 15 is pushed downward by the pushing force. Accordingly, the inversion plate 15 is inverted as shown by the dotted chain lines in FIG. 7, so that the inversion plate 15 comes into contact with the electrode 13a1. As a result, the electrode 13a and the conductive pattern 13b are electrically connected to each other, through the inversion plate 15, so that a switch output is changed to ON. When, for example, the switch output is turned ON, the coordinate input signal generated by the flat input device 4 is ignored and only the input from the switching element 11 is recognized by the control unit 21. In addition, when the inversion plate 15 is inverted, the reaction force generated by the inversion plate 15 is transmitted to the operator's finger as a tactile feel. On the contrary, when the switching element 11 is not operated, the input operation of the flat input device 4 is recognized by the control unit 21.

[0059] In addition, the above-described switches provided for each indication mark 8 may be connected to a single switch circuit, and the switch circuit may be constructed such that the output therefrom is set to ON when any one of the switches is pushed. In such a case, when the output from the switch circuit is turned ON, detection signals of the flat input device 4 may be ignored, that is, the mode in which only the switch input of the indication marks 8 is recognized may be selected.

[0060] Next, an input apparatus according to a second embodiment of the present invention will be described

below with reference to FIGS. 8, 9A, and 9B. FIG. 8 is an exploded perspective view of the input apparatus, and FIGS. 9A and 9B are sectional views of FIG. 8 cut along line IX-IX, wherein FIG. 9A shows a state in which the input apparatus is not operated and FIG. 9B shows a state in which the input apparatus is being operated.

[0061] In an input apparatus 30 shown in FIG. 8, which is formed as a mobile phone, a display panel 3 which serves as a display unit and an input unit are mounted on a housing 2. This input apparatus 30 includes a flat input device 31 which is different from that of the above-described input apparatus 1. Other constructions of the input apparatus 30 are similar to those of the above-described input apparatus 1, and explanations thereof are thus omitted.

[0062] The flat input device 31 is of a pressure-sensitive type or a capacitive type, and an X-direction detection electrode and a Y-direction detection electrode are disposed such that they oppose each other in a matrix pattern with a resin sheet formed of polyethylene terephthalate (PET) therebetween. The resin sheet provided with the above-described electrodes are disposed on a rigid substrate formed of a glass-epoxy resin or a metal. In addition, an indicator sheet 7 which is formed similarly to the first embodiment is laminated and fixed on the surface of the flat input device 31 at the front side and a tactile-feel-generating unit 33 is disposed behind the flat input device 31.

[0063] The tactile-feel-generating unit 33 includes a projection 35 formed such that an end thereof is moveable in the vertical direction. The projection 35 is formed behind the flat input device 31 at the center of a base 36 formed as a recess in the housing 2. Thus, the input apparatus is constructed such that a tactile feel is generated by a reaction force or the like when the projection 35 is pushed from above. The tactile-feel-generating unit 33 may also be formed of the above-described dome-shaped inversion plate.

[0064] A pantograph like device 34 is disposed between the flat input device 31 and the base 36 as an elevation unit.

[0065] As shown in FIG. 8, the flat input device 31 is supported by the pantograph like device 34 such that the flat input device 31 is able to move, while being maintained horizontal, in the vertical direction. The pantograph like device 34 has parallel upper and lower contact surfaces that can move vertically relative to each other while maintaining their parallel relationship.

[0066] In the state shown in FIG. 9A, that is, in a state in which the operation is not performed, the pantograph 34 is slightly stretched upward so that the flat input apparatus 31 and the indicator sheet 7 are positioned at the upper end of the housing 2. At this time, the flat input device 31 may be raised by the elastic force applied from the protrusion 35 or by an electric member (not shown), such as a coil spring, provided on the base 36.

[0067] When the flat input device 31 is pushed at any location from above by a finger or the like, the pantograph 34 collapses and the flat input device 31 and the indicator sheet 7 are evenly pressed downward. As a result, a reaction force generated when the projection 35 is pushed is transmitted to the operator as a tactile feel, so that the operator reliably recognizes that he or she has pressed the flat input device 31.